

**DOE/ID-11059**  
**Revision 0**  
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**June 2003**



U.S. Department of Energy  
Idaho Operations Office

***Construction Complete Report for the Idaho  
National Engineering and Environmental  
Laboratory, Central Facilities Area, Operable  
Unit 4-13, CFA-08 Sewage Plant Drainfield***



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Prepared for the  
U. S. Department of Energy  
Idaho Operations Office

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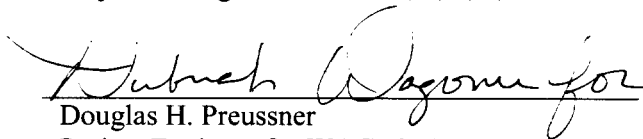
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## ABSTRACT

This report describes the remedial action for the Waste Area Group 4, Operable Unit 4-13 Sewage Plant Drainfield (CFA-08). The primary remedial action objectives for this site were to:

- Prevent direct human exposure to Cs-137 that would result in total excess cancer risk greater than 1 in 10,000
- Prevent ingestion and inhalation of Cs-137 that would result in a total excess cancer risk greater than 1 in 10,000 or a total hazard index greater than 1.0.

An evapotranspiration cover was installed over the Sewage Plant Drainfield. The cover was revegetated, and a fence with signs and two monuments were erected. The cover consists of a layer of pit run gravel as required to smooth the grade, 0.3048 m (1 ft) of cobble, 0.100584 m (0.33 ft) of pea gravel, and 1.2192 m (4 ft) of native soil (from the Lincoln Boulevard borrow source).

The remedial action was completed as described in the *Remedial Design Remedial Action Work Plan for Waste Area Group 4, CFA-08 Sewage Plant Drainfield, OU 4-13*, with the only exception detailed in Section 4 of this report.



# CONTENTS

ABSTRACT.....	iii
ACRONYMS .....	vii
1. INTRODUCTION.....	1
1.1 Organization of the Construction Complete Report .....	1
1.2 Background.....	2
1.3 Physical Site Description .....	2
1.4 Remedial Action Objectives .....	5
1.5 Selected Remedy .....	5
2. DISCUSSION OF REMEDIATION ACTIVITIES.....	7
2.1 Remedial Action Working Documents.....	7
2.2 Site Preparation and Mobilization.....	8
2.2.1 Personnel Training Requirements.....	8
2.2.2 Staging and Storage of Equipment and Supplies .....	9
2.2.3 Regulatory Compliance.....	9
2.2.4 Idaho National Engineering and Environmental Laboratory Work Control Requirements.....	9
2.3 Remedial Action.....	10
2.3.1 Site Preparation.....	10
2.3.2 Remediation Activities.....	10
2.4 Occupational Health and Safety .....	11
2.4.1 Industrial Hygiene Summary .....	11
2.5 Decontamination .....	12
2.6 Site Restoration .....	12
2.7 Demobilization.....	12
3. COSTS.....	13
4. MODIFICATIONS TO THE REMEDIAL DESIGN/REMEDIAL ACTION WORK PLAN.....	14
5. QUANTITIES AND TYPES OF WASTE GENERATED .....	15
5.1 Waste Minimization and Segregation.....	15

5.2	Packaging and Labeling.....	15
5.3	Waste Types.....	15
6.	PREFINAL AND FINAL INSPECTION.....	16
7.	SUMMARY AND VERIFICATION OF WORK PERFORMED.....	17
7.1	Summary of Work Performed.....	17
7.2	Verification of Work Performed .....	18
7.3	Performance Standards and Construction Quality Control.....	18
8.	CERTIFICATION THAT REMEDY IS OPERATIONAL AND FUNCTIONAL.....	20
9.	REFERENCES.....	21
	Appendix A—Prefinal Inspection Checklist.....	23
	Attachment A—Borrow Source Request Forms .....	29
	Attachment B—Photos of Fence Removal and Mowing.....	35
	Attachment C—Waste Disposition of Debris in CFA-08.....	39
	Attachment D—Documentation of Well Abandonment at CFA-08 .....	43
	Attachment E—Construction Planning Package, Consumer Grade, and Supporting Laboratory Results .....	53
	Attachment F—Photographic Record for Inspection Report.....	129
	Attachment G—Integrated Waste Tracking System Material and Waste Characterization Profile .....	135
	Attachment H—Vendor Data Status Report and Schedule.....	155
	Appendix B—CFA-08 Final Grade Drawings for Pit Run, Pea Gravel, Cobble, and Topsoil .....	161
	Appendix C—Photographic Record of CFA-08 Sewage Plant Drainfield Cover Installation .....	167
	Appendix D—Revision to the Comprehensive Facility and Land Use Plan .....	179

## FIGURES

1.	Idaho National Engineering and Environmental Laboratory .....	3
2.	The CFA-08 .....	4

## TABLES

1.	Remedial action costs .....	13
2.	Waste Area Group 4 CFA-08 Sewage Plant Drainfield waste summary.....	15

## ACRONYMS

ARAR	applicable or relevant and appropriate requirement
BBWI	Bechtel BWXT Idaho, LLC
bgs	below ground surface
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFA	Central Facilities Area
CFR	Code of Federal Regulations
DOE-ID	U. S. Department of Energy Idaho Operations Office
HASP	Health and Safety Plan
HAZWOPER	Hazardous Waste Operations and Emergency Response
IC	institutional control
IDAPA	Idaho Administrative Procedures Act
IDEQ	Idaho Department of Environmental Quality
INEEL	Idaho National Engineering and Environmental Laboratory
HAZMAT	hazardous material
MCP	management control procedure
O&M	operations and maintenance
OU	operable unit
RAO	remedial action objective
RCT	radiological control technician
RD/RA	remedial design/remedial action
RMA	radiological materials area
ROD	Record of Decision
RWP	Radiation Work Permit
USC	United States Code
WAG	waste area group





# **Construction Complete Report for the Idaho National Engineering and Environmental Laboratory, Central Facilities Area, Operable Unit 4-13, CFA-08 Sewage Plant Drainfield**

## **1. INTRODUCTION**

In accordance with the *Federal Facility Agreement and Consent Order for the Idaho National Engineering Laboratory* (DOE-ID 1991) among the U. S. Department of Energy Idaho Operations Office (DOE-ID), the U. S. Environmental Protection Agency, and the Idaho Department of Environmental Quality—hereafter referred to as the Agencies—the DOE-ID submits this *Construction Complete Report for the Idaho National Engineering and Environmental Laboratory, Central Facilities Area, Operable Unit 4-13, CFA-08 Sewage Plant Drainfield*.

The submittal of this Construction Complete Report (a secondary document) was defined in the *Central Facilities Area, Waste Area Group 4, Operable Unit 4-13 Remedial Design/Remedial Action Scope of Work (Final)* (DOE-ID 2000a). At the completion of the CFA-04 remedial action, a final Remedial Action Report (a Federal Facility Agreement and Consent Order primary document) will be submitted to the Agencies, which compiles this Construction Complete Report and the Central Facilities Area (CFA) -10 Construction Complete Report. Under the current remediation management strategy outlined in the Federal Facility Agreement and Consent Order (DOE-ID 1991), the location identified for the remedial action is designated as the Waste Area Group (WAG) 4, Operable Unit (OU) 4-13 Sewage Plant Drainfield (CFA-08) at the Idaho National Engineering and Environmental Laboratory (INEEL).

This report describes the work performed, discusses any modifications to the remedial design, and documents the final status of the remedial action.

### **1.1 Organization of the Construction Complete Report**

This Construction Complete Report describes the activities associated with the WAG 4 remedial action for the Sewage Plant Drainfield (CFA-08). The following are brief descriptions of the Construction Complete Report's sections and appendices.

- Section 1 describes the background and history of WAG 4 and provides an overview of the selected remedies for the areas of concern
- Section 2 summarizes the remedial action activities
- Section 3 outlines the costs incurred during the remedial action
- Section 4 describes the modifications to the Remedial Design/Remedial Action (RD/RA) Work Plan
- Section 5 describes the waste streams generated during the remedial action
- Section 6 addresses the prefinal and final inspection checklists
- Section 7 includes the summary and verification of the work performed

- Section 8 provides certification that the remedial action functions as designed and meets the remedial action goals and objectives
- Section 9 lists the references
- Appendix A contains the prefinal inspection checklist and closeout letter for final inspection
- Appendix B includes CFA-08 final grade drawings for pit run, pea gravel, cobble, and topsoil
- Appendix C provides a photographic record
- Appendix D includes a revision to the Comprehensive Facility and Land Use Plan (DOE-ID 1996).

## 1.2 Background

Located 51 km (32 mi) west of Idaho Falls, Idaho, the INEEL is a government-owned, contractor-operated facility managed by the DOE-ID (Figure 1). Occupying 2,305 km<sup>2</sup> (890 mi<sup>2</sup>) of the northeastern portion of the eastern Snake River Plain, the INEEL encompasses portions of five Idaho counties: (1) Butte, (2) Jefferson, (3) Bonneville, (4) Clark, and (5) Bingham.

The Central Facilities Area is located in the south-central portion of the INEEL and has been used since 1949 to house many of the support services for all of the operations at the INEEL, including administrative offices, research laboratories, a cafeteria, emergency and medical services, construction and support services, workshops, warehouses, vehicle and equipment pools, bus system, and laundry facilities. The types of Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) (42 USC 9601 et seq.) remedial sites at CFA include landfills, underground storage tanks, aboveground storage tanks, drywells, disposal ponds, soil contamination areas, and a sewage plant.

The United States Navy first operated a sewage treatment facility at CFA from 1944–1953 (Figure 2). This system consisted of a septic tank (CFA-716), a sludge drying bed, and two distribution areas. In 1953, a new system was constructed that utilized the original septic tank, a new sludge drying bed, and an expanded drainfield with additional distribution areas, trickling filters, digesters, and two clarifiers. This system operated, with some modifications, until February 1995. It received effluent from sewage waste lines, chemical laboratories, craft shops, warehouses, photographic services, vehicle services, a medical dispensary, maintenance repair shop, and laundry facilities (which processed low-level radiologically contaminated clothing). Average flow through the sewage treatment facility ranged between 416,350 L/day (110,000 gal/day) to 662,375 L/day (175,000 gal/day).

## 1.3 Physical Site Description

The CFA drainfield is approximately 61 × 305 m (200 × 1,000 ft), with linear trenches that are approximately 1.8 m (6 ft) deep. It contains five distribution areas, each with 20 concrete drain pipes approximately 1.1 m (3.5 ft) below ground surface (bgs). The distribution pipes are surrounded by screened gravel in linear trenches 0.76 m (2.5 ft) wide, 1.8 m (6 ft) deep, and 61 m (200 ft) long. Basalt bedrock is encountered between 6.1 m (20 ft) and 9.8 m (32 ft) bgs in the vicinity of the drainfield. A sedimentary interbed was encountered at a depth of approximately 31.1 m (102 ft) bgs in two borings drilled adjacent to the drainfield (Burns 1995). A t-post and a wire radiological-control fence were placed around a portion of the drainfield. A cyclone mesh fence was erected around the periphery of the entire drainfield in Calendar Year 2000. Institutional control signs were placed on the mesh fence.



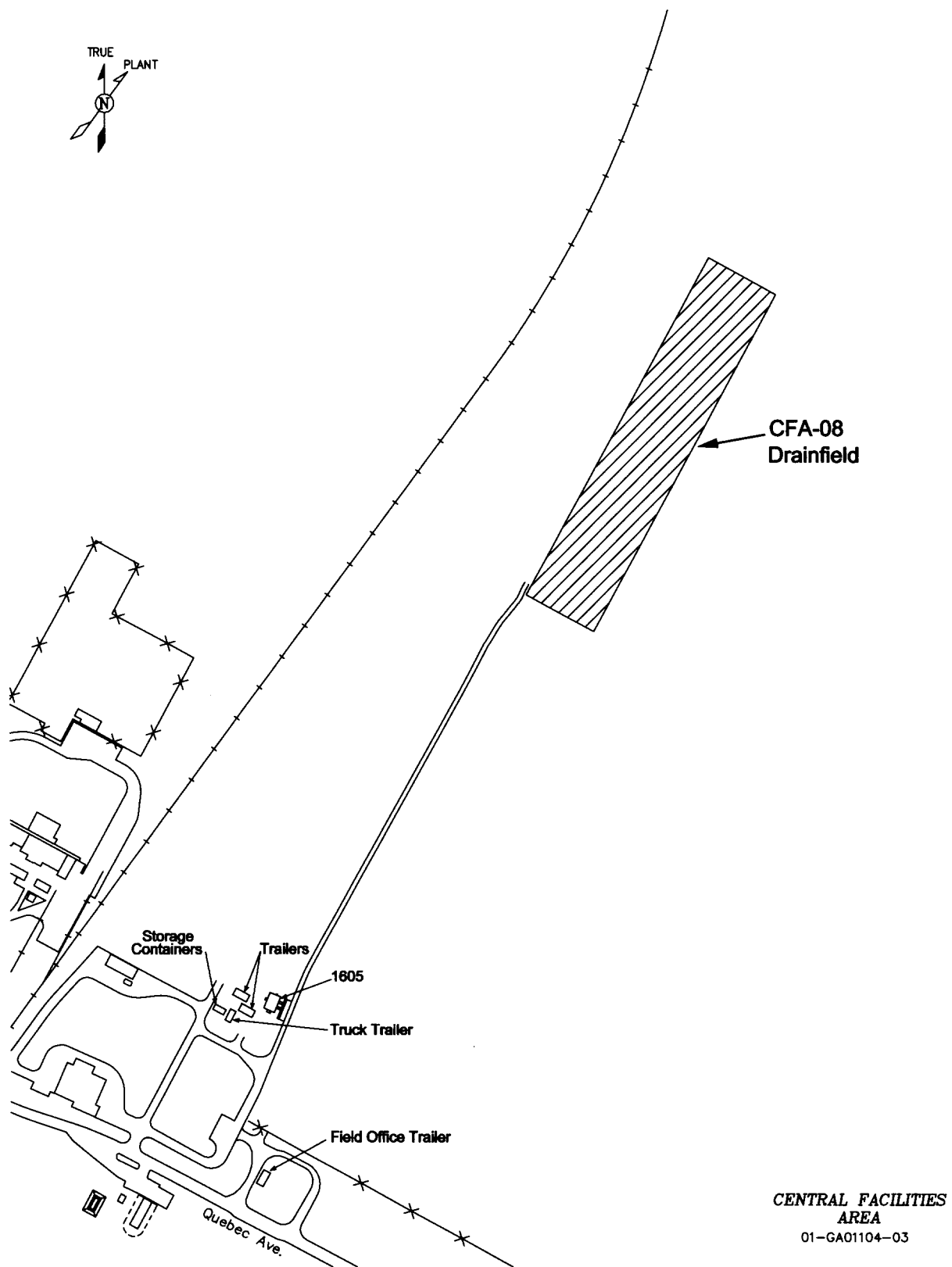


Figure 2. The CFA-08.

## 1.4 Remedial Action Objectives

The remedial action objectives (RAOs) for CFA-08 were developed in accordance with the 40 *Code of Federal Regulations* (CFR) 300, “National Oil and Hazardous Substances Pollution Contingency Plan,” and refined through discussions amongst the Agencies. The RAOs are based on the results of human health and ecological risk assessments, as outlined in the *Final Comprehensive Record of Decision for Central Facilities Area Operable Unit 4-13* (DOE-ID 2000b). The intent of the RAOs is to set goals for the protection of human health and the environment. The following describes the RAOs for CFA-08 based on the decisions in the Record of Decision (ROD) (DOE-ID 2000b).

The primary RAOs for this site were to:

- Prevent direct human exposure to Cs-137 that would result in total excess cancer risk greater than 1 in 10,000
- Prevent ingestion and inhalation of Cs-137 that would result in a total excess cancer risk greater than 1 in 10,000 or a total hazard index greater than 1.0.

## 1.5 Selected Remedy

The Agencies selected containment as the remedy for the CFA-08 Sewage Plant Drainfield, based on consideration of the CERCLA requirements, the detailed analysis of alternatives, and public comments. Performance standards were to be implemented as design criteria for the site to ensure that the selected remedy protects human health and the environment. Institutional controls (ICs) are required to be maintained, and 5-year reviews are to be used to ensure that the selected remedy remains protective and appropriate.

The selected remedy met the threshold and balancing criteria and was the most cost effective of the three alternatives considered. Under this remedy, the contaminated site was covered with an engineered, protective cover. This cover was an engineered barrier constructed of layers of pea gravel, cobble, and soil with a vegetative cover. The cover was designed to isolate low-level radioactive contaminants from human and biotic intrusion and to provide radiation shielding for a period of 189 years. After 189 years, the final remediation goal for the CFA-08 Sewage Plant Drainfield was to reach the human health goal of 2.3 pCi/g Cs-137. The selected remedy was implemented, as stated in the ROD (DOE-ID 2002b).

This remedy’s continued effectiveness will be evaluated through soil-cover-integrity monitoring and aboveground radiological surveys. Because contamination must be left in place, ICs are necessary for CFA-08 to restrict access until the land can be released for unrestricted use. Institutional controls to be implemented at CFA-08 include:

- Restricting access through the use of fences, signs, and permanent markers
- Controlling land use leasing and property transfers
- Establishing and publishing surveyed boundaries
- Controlling activities on the land.

Performance standards in the ROD (DOE-ID 2002b) include the following design requirements for the cover:

- Develop and implement surface monitoring and maintenance programs to detect Cs-137 and contain it within the site boundary.
- Institute restrictions limiting land use/access for at least 189 years. Institutional controls will be maintained and transferred, as applicable, until Cs-137 has decayed to an acceptable risk level.
- Implement surface water controls to direct surface water away from the capped drainfield.
- Eliminate, to the extent practicable, the need for ongoing active maintenance following construction so that only surveillance, monitoring, and minor custodial care are required.
- Design and construct an adequate cover to inhibit erosion by natural processes for the specified design life of the cover.
- Incorporate features that will inhibit biotic intrusion into the contaminated drainfield.

## 2. DISCUSSION OF REMEDIATION ACTIVITIES

### 2.1 Remedial Action Working Documents

The *Remedial Design/Remedial Action Work Plan for Waste Area Group 4, CFA-08 Sewage Plant Drainfield, OU 4-13* (DOE-ID 2002a) lists the design criteria, describes the remedial design and how it was to be implemented for the remedial action, and serves as the guidance document for the CFA-08 remedial action. The following documents were included as appendices to the Remedial Design/Remedial Action Work Plan:

- Appendix A, “Design Drawings,” contains drawings that detail the present conditions (e.g., topography and fencing) at the site, as well as the work to be performed during the remedial action
- Appendix B, “Construction Specifications,” contains the technical specifications that provide the general terms and conditions required for completion of the remedial action
- Appendix C, “Erosion and Runoff Calculations,” provides numerical values for the ability of the cover to resist significant erosion and run-off during rainfall and wind events
- Appendix D, “Infiltration Calculations,” shows that the cover will significantly reduce meteorological infiltration within the drainfield
- Appendix E, “Air Emissions Modeling Results,” summarizes the results of the air emissions to satisfy project applicable or relevant and appropriate requirements
- Appendix F, “Waste Management Plan,” describes the management and disposal of waste generated during remedial activities
- Appendix G, “Cost Estimate,” provides the cost estimate, basis for the estimate, and related assumptions
- Appendix H, “Environmental Checklist”
- Appendix I, “Archaeological Clearance Recommendation”
- Appendix J, “Ordnance Survey Clearance”
- Appendix K, “CFA Nitrate Evaluation”
- Appendix L, “Safety Category List and the Safety Category Designation and Record.”

In addition, two separate documents were prepared for CFA cover installation. Specifically, the *Health and Safety Plan Idaho National Engineering and Environmental Laboratory Central Facilities Area, Operable Unit 4-13 Drainfield (CFA-08)* (INEEL 2002a) describes the possible hazards and the required actions to protect the health and safety of workers. The *Operations and Maintenance Plan for the Final Selected Remedies and Institutional Controls at Central Facilities Area, Operable Unit 4-13* (DOE-ID 2002b) details the long-term operations and maintenance (O&M) activities that will be conducted and IC requirements that will be implemented at WAG 4 sites, including the CFA-08 cover installation.



## 2.2 Site Preparation and Mobilization

The following activities were performed in order to prepare the site and mobilize for installation of the CFA-08 drainfield cover:

- Assembled the project work team and conducted a prejob briefing on work task assignments in accordance with the Health and Safety Plan (HASP) (INEEL 2002a) and Management Control Procedure (MCP) -3003, “Performing Pre-Job Briefings and Documenting Feedback.” Specific elements of the prejob briefing included identification of work to be performed and communication of the hazards and mitigation to enable safe completion of the work.
- Delivered and stored equipment and materials south of the drainfield.
- Inspected heavy equipment before it was used onsite.
- Identified and demarcated work areas, including installation of work zone fencing, signs, and posting.
- Obtained the required INEEL permits and authorizations for installation of the engineered barrier cover.

The following subsections discuss how the remedial action complied with INEEL work control, training, radiological contamination control, and other regulatory requirements.

### 2.2.1 Personnel Training Requirements

Before the start of fieldwork, all workers were required to have the following training, as specified in Section 4 (Revision 1) of the *Health and Safety Plan, Idaho National Engineering and Environmental Laboratory Central Facilities Area, Operable Unit 4-13 Drainfield (CFA-08)* (INEEL 2002b):

- Site-specific training, as required by the Health and Safety Plan (INEEL 2002b)
- Project-specific training
- 40-hour Hazardous Waste Operations and Emergency Response (HAZWOPER)
- Hazardous Waste Operations 24-hour “on-the-job” training, as necessary
- 8-hour HAZWOPER site supervisor, as necessary
- Biohazard training
- Radiation Worker II
- Hearing conservation
- HAZMAT employee general awareness training
- CPR and medic first aid, as necessary.

Certifications of training and training updates were maintained in the training database on the INEEL Intranet.

### **2.2.2 Staging and Storage of Equipment and Supplies**

A staging area was established south of the Sewage Plant Drainfield. The area was used to store and operate project-related equipment and materials close to the work without having personnel enter a contaminated area. The staging area served as a command post from which personnel conducted remedial operations, performed prejob briefings, documented activities, and performed other functions necessary to implement the RD/RA Work Plan (DOE-ID 2002a). A control point restricting entrance and egress between the decontamination area and the staging area was established. All staging activities, and storage of equipment and material, were done in accordance with the HASP (INEEL 2002b).

### **2.2.3 Regulatory Compliance**

The OU 4-13 CFA-08 remedial action complied with all applicable or relevant and appropriate requirements, as outlined in Section 4.2 of the RD/RA Work Plan (DOE-ID 2002a).

### **2.2.4 Idaho National Engineering and Environmental Laboratory Work Control Requirements**

To comply with INEEL procedures and requirements for conducting fieldwork, the following items were completed before the start of the remedial action:

- MCP-9106, "Management of INEEL Projects," work package
- Project listed on CFA work planning schedules
- Gravel/borrow request form
- Formal prejob briefing
- Subsurface investigation
- Radiation work permit
- National Environmental Policy Act documentation and Environmental Checklist (included in the RD/RA Work Plan [DOE-ID 2002a])
- Storm Water Pollution Prevention Plan (not needed since the drainfield is outside the storm water corridor)
- Spill prevention and control measures
- Cultural Resources and Historical Property Survey (included in the RD/RA Work Plan [DOE-ID 2002a])
- Ordnance survey.

Before the start of each day's work, a plan-of-the-day meeting was held to review the day's work activities and to discuss any new issues that might have been created by the previous day's work activities.

## **2.3 Remedial Action**

The remedial action work at the CFA-08 Sewage Plant Drainfield consisted of placing rock and soil in accordance with the requirements in the RD/RA Work Plan (DOE-ID 2002a). Additional detail is provided in the following section for the remedial activities that occurred at the CFA-08 Sewage Plant Drainfield. Deviations from the original RD/RA Work Plan (DOE-ID 2001) are noted, and a detailed discussion of these deviations is presented in Section 4 of this report. The details of the remedial action field activities are contained in the INEEL Environmental Restoration Operations Field Logbook (ER-059-02), which is located in the project files.

### **2.3.1 Site Preparation**

A plot plan delineating the laydown, drainfield, and stockpile areas was prepared before the field activities commenced. The areas directly associated with placement of the engineered cover at the CFA-08 drainfield required preparation before construction of the cover. The following general site-preparation activities were accomplished before construction of the cover. Special requirements are stated, as noted on the design drawings. The specific work task elements necessary to complete this work are identified in Section 5.3 of the RD/RA Work Plan (DOE-ID 2002a).

The chainlink fence, supporting posts, gates, and signs that encompassed four sides of the Sewage Plant Drainfield were removed in the winter of 2001.

Starting on March 11, 2002, three wells were abandoned in place: one interbed well (IB-1) and two shallow perched water-monitoring wells (DA-1 and DA-4). These wells were abandoned in accordance with Idaho Administrative Procedures Act (IDAPA) 37.03.09.025.12.a, following MCP-3480, "Environmental Instruction for Facilities, Processes, Materials, and Equipment." Two out-of-service telephone poles also were removed and delivered to the CFA Bulky Waste Landfill. On April 9, 2002, additional railroad ties and other wooden debris were removed from the drainfield area. The radiological control technician surveyed all material removed from the drainfield. No radiological contamination was present on any of the debris removed from the drainfield. Before commencement of cover construction and removal of borrow material from the Spreading Area "A," a noxious weed control plan was prepared and approved to mitigate the spread of noxious weeds, as identified in the Environmental Checklist provided in the RD/RA Work Plan, Appendix H (DOE-ID 2002a). The weeds in Spreading Area "A" (approximately 4 acres) were sprayed to kill the weeds and prevent additional areas from becoming weed-infested.

### **2.3.2 Remediation Activities**

Before commencing work, the subcontractor provided the contractor with all required submittals, work plans, bonds, and insurance. The subcontractor verified that all remedial activity personnel working under contract for the subcontractor were familiar with the relevant provisions of the project HASP (INEEL 2002b). The subcontractor provided the contractor with documentation confirming that all project personnel working for or through the subcontractor had received the necessary training and completed the medical examination requirements. The subcontractor submitted a work plan through the vendor data system. The project team approved this work plan before the subcontractor commenced fieldwork.

A biological survey of the drainfield area and Spreading Area “A” was performed before start of construction activities, and in accordance with the Environmental Checklist provided in Appendix H of the RD/RA Work Plan (DOE-ID 2002a), to identify any active sage grouse nesting activities for work that would be conducted between March 15 and June 15, 2002. During the construction activities, no other surveys were performed of the spreading area, as the spreading area was not accessed for soil removal. Sufficient soil was available from the Lincoln Boulevard borrow source.

The subcontractor mobilized to the site on May 20, 2002. Once the subcontractor mobilized to the site, craft personnel were trained on the HASP (INEEL 2002b) and project-specific work control documentation. The subcontractor removed the two-strand radiological-fence boundary under direct supervision of the RCT and installed a construction rope-fence boundary to delineate the work area. No radiological contamination was found on any fencing materials that were removed from the drainfield area. The subcontractor began to mow the drainfield under direct RCT supervision on May 21, 2002. No radiological contamination was detected in the mowing operation. The subcontractor also proof-rolled the area before placing the pit run, in accordance with Specification 2200, “Earthwork,” provided in Appendix B of the RD/RA Work Plan (DOE-ID 2002a). In addition, the distribution boxes were broken up and leveled with the existing ground. The subcontractor completed the proof rolling on May 22, 2002.

Placement of pit run material began on May 23, 2002. The subcontractor also began to receive pea gravel from an off-Site vendor. Pit run was placed over the entire drainfield area in accordance with the RCT’s instructions. By placing pit run over the area, the RCT reduced the area to an underground radiological materials area. This allowed the subcontractor to drive trucks in and out of the area without performing surveys for radiological contamination. The subcontractor began delivering and placing the cobble on June 12, 2002. Cobble placement was 50% completed when the subcontractor began to place pea gravel on the east half of the drainfield. Placement of each layer was not started until surveys for in-place quantities were performed and the project team received and approved the information. Pea gravel placement began on June 25, 2002. Cobble placement was completed on June 27, 2002, and pea gravel was completed on July 11, 2002. The subcontractor began to haul soil from the Lincoln Boulevard pit on the same day the pea gravel was completed. Installation of the soil layer was completed on August 22, 2002. (See Appendix B for “as built” drawings showing each layer of soil cover. In addition, see Appendix C for photographs taken during soil cover installation.)

Dust suppression was implemented via subcontractor water trucks. All work locations used water trucks to apply water during operation of heavy equipment.

In November 2002, the drainfield and support areas were reserved and bark was placed in accordance with Specification 02486, “Revegetation,” in the RD/RA Work Plan (DOE-ID 2002a); the fence was installed in accordance with Specification 02444, “Chain Link Fencing”; and the concrete survey monuments were completed in accordance with the O&M Plan (DOE-ID 2002b).

## **2.4 Occupational Health and Safety**

The following sections discuss the personnel monitoring conducted on the OU 4-13 remedial action.

### **2.4.1 Industrial Hygiene Summary**

**2.4.1.1 Noise Surveillance.** The potential existed to expose personnel who operated heavy equipment, and personnel working near the heavy equipment, to noise levels in excess of 85 decibels. Implementation of a continuing, effective hearing conservation program whenever noise levels exceed an 8-hour, time-weighted average of 85 decibels is required by 29 CFR 1910.95, “Occupational Noise Exposure.” Routine noise assessments, conducted by the project industrial hygienist, demonstrated the

need for the program, which included the use of hearing protection. Employees at the task site wore acceptable hearing protection, as required.

**2.4.1.2 Heat and Cold Stress Surveillance.** The majority of the fieldwork took place in the hot summer months. The HASP (INEEL 2002a) identified the need to ensure that employees did not experience undue heat stress. The health and safety officer and industrial hygienist conducted periodic surveillances of personnel. Work/rest regimens were implemented as conditions dictated. Personnel were trained in identifying the symptoms of heat stress and how to handle a potential victim. Cool, potable drinking water was available at the task site to keep personnel hydrated.

**2.4.1.3 Radiological Surveillance.** The fieldwork took place in a radiologically contaminated area. All work performed on the Sewage Plant Drainfield was covered by an RCT. All work was performed under a radiation work permit. No contamination was found on equipment or personnel during the life of the project. All heavy equipment was surveyed for radiological contamination before being released from the INEEL.

## **2.5 Decontamination**

No decontamination was performed on this project, since no personnel or equipment was radiologically contaminated. In addition, there was no radiologically contaminated debris generated on this project.

## **2.6 Site Restoration**

The subcontractor used a motor grader to turn the soil on the drainfield and the associated parking area. The drainfield and the parking were required to be turned, as the reseeding of these areas would be unable to produce vegetation on a compacted surface. Bechtel BWXT Idaho, LLC (BBWI) construction forces installed a perimeter fence, signs, and two concrete survey monuments in October 2002. The drainfield and the parking area were reseeded in November 2002.

## **2.7 Demobilization**

Final demobilization of the subcontractor was completed on August 29, 2002.

### 3. COSTS

Total project costs for the OU 4-13 remedial action activities are provided in Table 1. These costs include the INEEL project management, materials, and labor costs associated with remediation of the site.

The estimated long-term cost for care taker, maintenance, surveillance and monitoring, and program management that are presented in the ROD are still applicable. These costs were not re-estimated as part of this remedial action. Remedial action costs are less than those presented in the ROD for the following reasons:

1. A geotextile layer originally planned for in the ROD cost estimate was not deemed to be necessary based on studies previously conducted at the INEEL by the Environmental Science and Research Foundation—Stoller Corporation. These studies have proven that the less expensive cobble/pea gravel layers of the CFA-08 cover are effective against insects, small mammals, and vegetation bringing contaminated material to the surface.
2. The cost estimate in the ROD included a 30% contingency that was not used.

Table 1. Remedial action costs.

Activity	ROD Cost Element, \$K <sup>a</sup>	Updated Cost Element, \$K
RD/RA Document Preparation	378.1	395.2
Prefinal Inspection and Construction Complete Report	—	132.5 <sup>a</sup>
Site Characterization	345.8	337.5 <sup>a</sup>
Remedial Action	5,400	1,255.5 <sup>a</sup>
Project/Construction	—	290.3
Management Safety and Quality Assurance Support		
Site Preparation	—	29.4
Subcontractor	—	68.5
Mobilization/Demobilization, Training, and Mowing		
Haul and Place Pit Run Gravel	—	41.8
Haul, Stockpile, and Place Pea Gravel	—	144.8
Haul and Place Cobble Rock	—	163.0
Haul and Place Soil	—	341.0
Safety Incentive	—	50.0
Revegetation and Installation of Fence, Monuments, and Signs	—	126.7
<b>Total</b>	<b>6,560</b>	<b>2,193.1</b>

a. Cost estimates from the ROD include 30% contingency and a factor of 1.0727 to convert from FY 1999 to FY 2001 dollars.  
RD/RA = remedial design/remedial action.  
ROD = Record of Decision.

#### **4. MODIFICATIONS TO THE REMEDIAL DESIGN/REMEDIAL ACTION WORK PLAN**

Several modifications to the RD/RA Work Plan (DOE-ID 2002a) were required during the course of the project. A brief description of each modification is listed below:

- During the start of the project, the project team determined that the Lincoln Boulevard pit had enough soil to complete the cover installation. The Spreading Area “A” was not used, thus saving the contractor approximately \$48,000. In addition, the Lincoln Boulevard soil was the more desirable material type for the drainfield reseeding effort.
- Additional pea gravel was required to complete the installation of the pea gravel layer. The cobble material and the void spaces found in the cobble allowed more pea gravel to infiltrate the cobble layer, thus requiring additional pea gravel. Additional pea gravel cost the contractor \$52,000.
- At the request of the subcontractor, soil placement lifts were changed from 12 to 8 in. The 12-in. lifts would have compacted the underlying layer of soil too much as the next layer was being placed. This change in the specification was made so that the underlying soil lifts would not exceed compaction requirement in the specifications.

## 5. QUANTITIES AND TYPES OF WASTE GENERATED

Waste generated during the remedial activities was managed in accordance with the requirements delineated in Appendix F of the WAG 4 RD/RA Work Plan (DOE-ID 2001). The INEEL Waste Generator Services was responsible for managing all waste. This was done in accordance with INEEL procedures.

### 5.1 Waste Minimization and Segregation

Waste minimization was achieved through design and planning to maintain efficient operations. To achieve this goal, waste streams were segregated by the field activity being conducted at the time of generation. Waste types generated included nonconditional industrial waste, conditional industrial waste, and nonhazardous waste. Waste containers were provided for each specific waste stream and were maintained inside the work area until removed for either storage or disposal.

### 5.2 Packaging and Labeling

Waste was packaged in accordance with the criteria set forth in the *Idaho National Engineering and Environmental Laboratory Waste Acceptance Criteria* (DOE-ID 2003). The types of containers used included the following:

- 55-gal drums
- Dump truck for bulk waste destined for disposal at the CFA landfill.

All containers were labeled in accordance with INEEL procedures and all applicable state, federal, and local regulations.

### 5.3 Waste Types

Various waste types were generated. These included debris (e.g., polyvinyl chloride piping, plastic sheeting, galvanized fence piping, and wood). Hazardous waste determinations were completed before any waste was sent to the CFA Bulky Waste Landfill. Table 2 summarizes the waste that was generated during the remediation activities.

Table 2. Waste Area Group 4 CFA-08 Sewage Plant Drainfield waste summary.

Waste Stream	Volume	Disposal Site	Status
Petroleum-contaminated soil	1 yd <sup>3</sup>	CFA landfill	Disposed
Petroleum-contaminated plastic sheet and polyvinyl chloride piping	8 yd <sup>3</sup>	CFA landfill	Disposed
Wood debris, including telephone poles	100 ft	CFA landfill	Disposed
Galvanized fence/fence posts	2,000 linear ft	Stored for recycling	N/A

CFA = Central Facilities Area.  
N/A = not applicable.



## 6. PREFINAL AND FINAL INSPECTION

The contractor conducted the prefinal inspection of CFA-08 on August 20, 2001, as indicated by the prefinal inspection checklist in Appendix A. The Agencies were informed of the prefinal inspection's results by e-mail. The items not complete at the time of the prefinal inspection are as follows:

- Reseeding of the drainfield, borrow source, and parking area south of the drainfield.
- Installation of the new perimeter fence around the drainfield.
- Installation of signs and two concrete survey monuments.
- Survey boundaries and descriptions of land use controls updated in the *Idaho National Engineering and Environmental Laboratory Comprehensive Facility and Land Use Plan* (DOE-ID 1996).
- Removal of temporary exclusion zones, work control areas, equipment decontamination zones, and temporary accumulation areas. Removal of excess materials, such as rope, wire, fence posts, etc.

Installation of the fence, signs, and monuments as well as reseeded were completed in December 2002. See the photographic record in Appendix C for verification that Items 7, 16, and 17 in the construction-planning package, consumer-grade inspection checklist (Attachment E, Appendix A) have been completed. Additionally, the photographic record in Appendix C verifies that Items 7, 8, and 11 of the prefinal inspection checklist (Appendix A) are complete. See Appendix D for a copy of the *Comprehensive Facility and Land Use Plan* to verify Item 10 of the prefinal inspection checklist.

## **7. SUMMARY AND VERIFICATION OF WORK PERFORMED**

The primary work activities for the OU 4-13 remedial action included:

- Abandoning one interbed/monitoring well (IB-1) and two shallow monitoring wells (DA-1 and DA-4).
- Removing existing fencing, telephone poles, and wood debris.
- Demolishing and abandoning in-place the five distribution boxes.
- Reducing existing vegetation on the drainfield and toe area of the cover by mowing.
- Excavating, hauling, and placing earthen materials comprising the cover in accordance with the design drawing and specification.
- Reseeding the cover vegetation and revegetating all areas affected by the project activities with the exception of the access roads to the drainfield and CFA borrow source. The access roads will remain in place.
- Installing a chain link fence around the drainfield and placing signs and permanent markers.

### **7.1 Summary of Work Performed**

The remedial action has been completed in accordance with the RD/RA Work Plan (DOE-ID 2002a).

The remedial action included the following:

- The BBWI construction forces abandoned three wells. (See Section 2.3.1 of this document for more information.)
- The perimeter fence, telephone poles, and wooden debris were removed by BBWI construction forces and disposed of at the CFA landfill or stored for recycling (fence and fence posts) or reuse.
- Upon award of the subcontract, the radiological fence boundary was removed and the subcontractor installed a temporary fence. The aboveground radiologically contaminated distribution boxes were demolished in place, filled with pit run gravel from the CFA pit, and the work area was mowed.
- The subcontractor established a control point for survey purposes and began placement of pit run gravel in the drainfield area. Cobble, pea gravel, and soil were installed after completion of pit run placement in order to complete construction of the sewage drainfield cover.
- Fence installation, monument placement, sign placement, and reseeded were completed in November 2002.

## **7.2 Verification of Work Performed**

Verification of the work performed was documented throughout the duration of the project. The construction coordinator maintained a daily logbook (ER-059-02) and site attendance logbook (ER-058-02) that detailed each day's work activities, numbers and names of personnel on the job site, and their functions. Copies of the daily logbooks can be obtained from the project files and on the INEEL Intranet through the INEEL Environmental Restoration Project Files (formerly called the Optical Imaging System). Periodic management assessments were conducted during the remedial action to verify that work was being completed on schedule and in accordance with the RD/RA Work Plan (DOE-ID 2002a).

A prefinal inspection of the site was conducted on August 20, 2002, to verify that the work outlined in the WAG 4 RD/RA Work Plan (DOE-ID 2001) was accomplished. Results of this inspection are documented in the checklist presented in Appendix A.

## **7.3 Performance Standards and Construction Quality Control**

The cover was built as designed. See Appendixes A and B for final topographical surveys. Quality of the cover installation was controlled by review and approval of vendor data (see Appendix A for summary of vendor that was reviewed) and periodic inspections to verify compliance of the work to the drawings and specifications (Appendix B). Vendor data included subcontractor's topographical surveys of the cover and the borrow source, redline construction drawings, and sieve test reports for cover materials acquired off-Site. The inspection checklist included periodic topographical surveys of final elevations of the different layers and the borrow source as well as independent laboratory testing of cover materials.

Performance standards in the ROD (DOE-ID 2000b) include design requirements for the cover and are satisfied in the installation of the CFA-08 drainfield cover, as indicated below:

- Develop and implement surface monitoring and maintenance programs to detect Cs-137 and contain it within the site boundary.
  - Radiological surveys will be done in accordance with the O&M Plan (DOE-ID 2002b).
- Institute restrictions limiting land use/access for at least 189 years. Institutional controls will be maintained and transferred, as applicable, until Cs-137 has decayed to an acceptable risk level.
  - Institutional controls will be maintained in accordance with the O&M Plan (DOE-ID 2002b).
- Implement surface water controls to direct surface water away from the capped drainfield.
  - The cover was designed with a crown and a 10:1 slope to provide water run-off.
- Eliminate, to the extent practicable, the need for ongoing active maintenance following construction so that only surveillance, monitoring, and minor custodial care are required.
  - The designed cover does not need any ongoing active maintenance—only surveillance, monitoring, and minor maintenance.
- Design and construct an adequate cover to inhibit erosion by natural processes for the specified design life of the cover.
  - The cover was designed with a very shallow slope (10:1) that inhibits erosion.

- Incorporate features that will inhibit biotic intrusion into the contaminated drainfield.
  - The cover was designed with a layer of cobble rock and a layer of pea gravel that inhibits root growth and animal intrusion.

## **8. CERTIFICATION THAT REMEDY IS OPERATIONAL AND FUNCTIONAL**

As stated in the ROD (DOE-ID 2000b), the RAOs and the remedial action goals were established to reduce or eliminate the risk to human health and the environment.

This report certifies that the remedies selected in the ROD (DOE-ID 2000b) and detailed in the RD/RA Work Plan (DOE-ID 2002a) have been completed and the remedies are operational and functional. The O&M Plan (DOE-ID 2002b) describes the long-term O&M activities that will be conducted to ensure that the selected remedy remains protective of human health and the environment. The Institutional Control Plan, an appendix to the O&M Plan, outlines the IC requirements for the CFA-08 drainfield cover. Institutional controls for visible access restrictions at the CFA-08 Sewage Plant Drainfield site consist of permanent markers, warning signs, and fencing. These access restrictions will be maintained for a period of 189 years to inhibit intrusion into the buried waste, with the option to discontinue restrictions sooner based on the results of a 5-year review.

## 9. REFERENCES

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MCP-3003, 2002, "Performing Pre-Job Briefings and Documenting Feedback," Revision 10, *Manual 9-Operations*, October 2002.

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